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One of the problems of television teaching is in the area of student instructor interaction. The instructor has no way of knowing whether or not any learning is taking place or if the students are listening.

A feedback system has been developed to enable a student to indicate his response to a TV lecturer's question by pushing one of five buttons at student stations in the TV lecture area. Via a read-out device the instructor evaluates the student reponses and answers; then he elaborates his discussion or he continues lecturing. Chart recorders keep a permanent record for later analysis. An earlier study indicated that this feedback system could be effective in the humanities. This study follows similar lines using the social science area.

The experimental group of 100 students selected at random responded to questions presented by the TV lecturer by pushing one of five buttons located at a student station in the classroom. Control groups in other rooms received the same lecture at the same time but did not have feedback equipment. A final examination was conducted nine weeks after the conclusion of the lectures to test both feedback and retention.

Results show that the experimental group did significantly better on the nonfeedback questions, the control group demonstrated no difference in performance on feedback and nonfeedback questions, and the two groups did not differ with respect to performance.

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THE EFFECT OF IMMEDIATE FEEDBACK ON LEARNING IN SOCIAL SCIENCE

JOHN C. WOODWARD

SEPTEMBER 1964

Report 8

SUPPORTED BY A GRANT FROM THE FUND FOR THE ADVANCEMENT OF EDUCATION

THE EFFECT OF IMMEDIATE FEEDBACK ON LEARNING IN SOCIAL SCIENCE

John C. Woodward

September 1964

Report No. 8

The feedback equipment and funds for this experiment were furnished under a grant from the General Electric Foundation, Mr. Roy J. Johnston, Director of Communications Services, University of Miami, Principal Investigator. The experiment was designed and conducted by Dr. John C. Woodward, Director of Evaluation, Office for the Study of Instruction, University College, University of Miami, Coral Gables, Florida.

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The Effect of Immediate Feedback on Learning in Social Science

Introduction and Statement of the Problem

One of the problems inherent in television teaching is in the area of student instructor interaction. The instructor has no way of knowing whether or not any learning is taking place, or for a matter of fact if the students are even listening. Certainly these problems exist in the regular classroom situation but not to the degree that they are present in the TV lecture situation. In the traditional classroom the instructor may ascertain how the instruction is going at any point by various means. The instructor may question the students, the students may question the instructor. The instructor may determine to some extent the general effect by observing the students' reactions. The puzzled looks, the restlessness, the nods of understanding, etc. all give the classroom instructor clues to what is going on and cues as to what to do next.

This is not the case with television teachings. The television teacher must continue on the basic assumption that the concepts being presented are being understood by the majority of the students. Obviously this assumption may be a very false one.

A study completed by Woodward[1] indicated that a system of feedback could be effective in the area of learning in the Humanities. The experiment reported here follows similar lines using the Social Science area.

The basic problems of this research were:

1) The effect on student learning of immediate feedback to instructors of information concerning the amount of learning taking place during a TV lecture.

2) The effect on learning of immediate feedback to students of the results of responses made to learning situations during a TV lecture.

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[1] John C. Woodward, "The Effect of Immediate Feedback on Learning in Humanities," Report No. 7, Office for the Study of Instruction, University College, University of Miami, June 1964.

For the purpose of this study the following operational definitions were used:

1. Learning - Responses to multiple choice questions raised by the instructor during the TV lecture in Social Science 202.

2. Instructor feedback - General Electric electrical feedback system which enables the student to indicate his response to a question by pushing one of five pushbuttons installed at each student station in the TV lecture hall. This information is fed back to the instructor via a read-out device which contains five meters corresponding to the five pushbuttons at the response stations, thus enabling him to see the percentage of students selecting each response. Continuous chart recorders corresponding to the buttons keep a permanent record of the class response for later analysis.

3. Instructor - TV Lecturer

4. Social Science 202 - Man in Contemporary Society II

5. Experimental group - 100 students selected at random (accident of registration), who will feedback information to instructors.

6. Control group - all students in other sections who will see the same telecasts as the experimental group but will not be able to feedback information to the instructor. (Vicarious feedback group)

The following hypotheses were used to guide the research:

A. Research hypotheses

1. Concepts presented in a feedback testing system during a TV lecture will be learned significantly better than concepts not presented in this way by both experimental and control groups in Social Science 202.

2. Concepts presented in a feedback system during a TV lecture will be learned significantly better by the experimental group than by the control group.

B. Null hypotheses

1. There is no significant difference between the learning of concepts presented by the feedback system and those not so presented for either the experimental or control group.

2. There is no significant difference between the learning of students involved in feeding back information to the instructor (experimental group) and students who see the questions and the correct responses but who do not respond to them electronically (control group).

METHOD OF PROCEDURE

The second semester of 1963-64, one-hundred Social Science 202 students were selected at random (by accident of registration). These students were assigned to University College, Room 180, which contains the General Electric feedback system. This group was designated as the experimental group. All other Social Science 202 students were designated as the control group.

For ten lectures the Social Science 202 TV lecturer designed multiple choice questions over material to be covered in the lecture. Part of these questions, along with the response choices, were prepared for visual presentation on TV at appropriate times during the TV lecture. The other questions were filed for later use in the evaluation of the research. When the question was presented via TV the students in the experimental group were required to indicate their response via the electronic feedback system. Control group students made no recorded response. As soon as the responses were recorded, the TV instructor evaluated the results of the responses to the question, identified the correct response to the students, and either elaborated the concept or went on with the lecture depending on the level of the response of the students.

Since it was demonstrated in a previous research with the feedback system in a Humanities course that feedback students' short term recall learning is significantly greater than students not so exposed, it was decided to test only the longer term retention gains.

The final examination, administered to both experimental and control groups nine weeks after the feedback lectures, contained eighteen questions over concepts presented but not used as feedback during the lectures, and eighteen questions constructed to measure the same concepts as eighteen items presented during feedback. The remainder of the examination contained questions over other aspects of the course, readings and other unit lectures.

Analysis of Data and Results

The control group consisted of three sections of students seated in three separate classrooms. It was decided to select one of these sections for the detailed analysis. Analysis of variance over the scores of these groups for the final examination was used to test the homogeneity assumed under conditions of random selection. The results of the analysis of variance confirmed the randomness of the groups. One of the three was selected at random for the final detailed analysis.

Table I is a summary of the findings for total test score by group.

TABLE I

Total Test Means and Standard Deviations by Group

Group	N	Mean	Std.Dev.
Experimental	95	60.63	11.59
Control	269	60.71	11.22

Analysis of *t*, sample groups unequal size, was used to test the significance of the difference between the means presented in Table I. The result of this analysis confirms a null hypothesis of no significant difference.

The scores for the groups were analyzed for the eighteen items covering feedback material and the eighteen items over lecture material not used in feedback. These findings are presented in Table II.

TABLE II

Means and Standard Deviations, Feedback, and Non Feedback by Group

Group	Feedback Material		Non Feedback	
	Mean	Std. Dev.	Mean	Std. Dev.
Experimental	11.81	2.46	12.35	2.35
Control	11.94	2.42	11.93	2.45

A t analysis for correlated samples was used to test the significance of the difference in means on feedback material and non feedback material by group. The results are as follows:

1. The non feedback mean for the experimental group is significantly greater than the feedback mean. t equals 2.217, .05 level of confidence.

2. The non feedback mean for the control group is not significantly different from the feedback mean. t equals .007.

t analysis sample groups unequal size was used to test the significance of the difference between the experimental and control group means for feedback and for the non feedback material. These analyses reveal the following:

1. The difference noted in Table II between the two groups feedback means is not significant.

2. The two groups do not differ significantly in scores on non feedback means.

SUMMARY AND CONCLUSIONS

An experiment was conducted to determine whether or not learning could be increased during a TV lecture by using a student feedback system. Students in the experimental group responded to questions presented by the TV lecturer by pushing one of five buttons located at the student station in the classroom. These questions were over material presented during the lecture. A read-out meter in the TV studio enabled the instructor to know immediately the percentage of student answers to each of the responses for the multiple choice questions. The TV instructor evaluated the results of the student answers, identified the correct answer to the students, and either elaborated the material or went on with the lecture depending on the level of the students' learning.

Control groups seated in other classrooms received the same lecture as the experimental group. They did not have feedback equipment.

A final examination conducted nine weeks after the conclusion of the experiment contained eighteen questions from feedback material and eighteen lecture material control questions. Results are as follows:

1. The experimental group did significantly better on the control (non feedback) questions than on the feedback questions.

2. The Control group demonstrated no difference in performance on feedback and non feedback questions.

3. The two groups did not differ with respect to performance on feedback or non feedback questions.

DISCUSSION

This experiment confirms the findings of an earlier experiment.[2] In the prior experiment it was found that groups who saw the same lectures as groups who had feedback equipment did as well as these groups on tests of learning.

This experiment does not support the hypothesis that concepts presented in a feedback system will be learned significantly better than concepts not so presented. In fact, for the experimental group pushing buttons (this is the only thing they did differently from the control group) appears to have had a negative effect on learning. Many interesting hypotheses can be raised concerning these findings. It would appear that further research is necessary in this area before any firm conclusions can be reached.

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[2] Woodward, op.cit., page 5.